



**SOCIO-ECONOMIC DETERMINANTS OF PROFITABILITY OF PIG PRODUCTION TECHNOLOGIES AMONG PIG FARMERS IN SOUTH EAST, NIGERIA.**

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**ABSTRACT**

The study was conducted in South East, Nigeria. One hundred and twenty farmers were used for the study. Multi stage random sampling technique was used to select the farmers. Structured questionnaire was used to collect data required for the study. Data collected was coded and analyzed using both qualitative and quantitative techniques. The result of the study revealed that the respondents were relatively young, well experienced with a mean of 9 years production experience and low-income earner with a mean income of ₦649,991. 67. Result of the coefficients of production experience showed a direct relationship between the variable and the farmers' profit at 5% level of significance in all the production technology used. The coefficient of access to credit for all the production technology was positive and significant at different level (10%, 5% and 5%) for intensive, semi intensive and extensive production technology. There was a positive relationship between the education attainment of the farmers and profit generated at 1%, 5% and 10% level of significance for semi intensive, intensive and extensive production technology respectively. The coefficient of cost of medication for extensive production technology was negative: -0.528 (-2.005) but significant ( $P < 0.01$ ) determinant of profit earned. The result of the profitability analysis determined showed that pig production was viable and profitable in the study area for all the technologies used. ROI was of 55k, 45k and 50k for intensive production technology, semi intensive production technology and extensive production technology respectively. Some of the recommendations were that farmers should form cooperative society, pull their resources together and enjoy the benefits of economics of scale and policy makers should develop policies that will enhance credit availability to pig farmers among others.

**Keywords:** Economic, Determinants, Profitability, Pig, Production and Technologies.

**INTRODUCTION**

In Nigeria, the agricultural sector is the major segment of the economy and foundation of economic growth. This sector is regarded as the most important non – oil economic activity that provides the basic needs of man, employment, income, raw materials for growing industries among others (Kaine, 2018; Kaine and Ume, 2017; Kaine and Awolumate, 2017). The protein requirement of man is derived from this basic sector which are obtained from both plant and animal products. The animal protein requirement of man is derived from snails, rabbits, grass cutter, fisheries, goat, sheep, cattle and pig (Kaine, 2021). Livestock production in Nigeria is an important vehicle for income and employment generation among the growing population, balance of trade, food security, provision of food, market opportunity and among others (Kaine, 2021; Mevlut *et al.*, 2016; Antonio and Silver, 2011). The authors further stated that the demand for livestock is most likely going to be doubled within the next twenty (20) years.

Pig (*Sus scrofa*), a monogastric animal is one of the sources of animal protein in Nigeria. It has a high fecundity rate with the ability to convert waste, agro-industrial by-products and crop residues, efficiently with little or no processing and marginal cost (Folasade *et al.*, 2017; Igwe *et al.*, 2013). It is a very good source of protein (pork consumption), poverty alleviation through income accruing from its' sales, source of manure for soil amendments, source of foreign exchange, skin for leather manufacturing, source of saving against uncertainties, source of income diversion, and source of employment among others (Bamiro, 2008; Rahman *et al.*, 2008). However, Okolo (2011) observed that pig production can be carried out using different technologies with the intensive technology being the most popular method. Ouma *et al.* (2013) and Okolo (2011) opined that intensive and semi intensive are becoming very popular because of increasing demand for pork due to growing population and destructive effects of pig to households and the environment. Ouma *et al.* (2014); Muhanguzi *et al.* (2012) and NAADS (2011) also reported that the intensive production technology involves intricate management and production techniques.

Authoritatively, it can be stated that the purpose of venturing into pig production using any of the technologies is to ensure high profitability. It is on this premise that the study was conducted to ascertain the socioeconomic determinants of profitability of pig production technologies among pig farmers in South East, Nigeria. Specifically, the study determined socioeconomic variables of the respondents, effects of the farmers' socioeconomic characteristics on profitability of the different technologies and costs and returns of the production technologies.

## **MATERIALS AND METHODS**

### **The study Area**

Abia, Anambra, Ebonyi, Enugu and Imo States make up the study area. The total population of the study area is 16,381,729 people (NPC, 2006) with a land mass of 10,952,400Km<sup>2</sup>. The total projected population figure using a 3.2% growth rate as at 2023 is twenty-seven million, two hundred and sixteen thousand, six hundred and twenty-one (27,216,621) people. This population is made up of thirteen million, five hundred and eighty-seven thousand and nineteen (13,587,019) male with a female fourteen million and one thousand, three hundred and ten (14,001,310). Farming is the major occupation of the people. Crops cultivated include but not limited to cassava, yam, okra, maize, cowpea and fruited pumpkin. The animals reared are pig, cow, poultry, goat, sheep, rabbit, snail, apiculture and grass cutter. They are also involved in off-farm income activities.

### **Sampling Procedure and Sample Size**

Multistage random sampling techniques was used to achieve the objectives of the study. The first stage was the random selection of three state out of five states. The selected states were Anambra, Imo and Ebonyi States. The second stage involved the random selection of agricultural zones from each of the selected States. A total of nine Agricultural zones were selected and used for the study. Third stage was the selection of Local Government Areas. Two Local Government Area (LGA) were selected from each of the States. Thereafter, ten communities were randomly selected from each of the six LGA giving a total of sixty towns that were used for the study. The final stage was the selection of pig farmers. Two farmers each were randomly selected from the selected communities. The sample size used for the study was one hundred and twenty (120).

### Analytical Techniques

Both quantitative and qualitative techniques were used to determine the data collected. The ordinary least square regression method (OLS) and Benefit Cost Ratio (BCR) were specified as here under

### Model Specification

#### Ordinary least squared regressions method

The explicit production function was estimated by

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \dots b_8X_8 + e \quad \dots(1)$$

Where:

Y = Profit (₦)

X<sub>1</sub> = Age of farmers (years)

X<sub>2</sub> = Labour (Mandays),

X<sub>3</sub> = Cost of Medication (Drugs, disinfectants and vaccines) (₦),

X<sub>4</sub> = Years of rearing experience (Years),

X<sub>5</sub> = Educational level (Years),

X<sub>6</sub> = Quantity of water (Litres),

X<sub>7</sub> = Household Size (No of persons),

X<sub>8</sub> = Credit Access (Dummy).

X<sub>1</sub> – X<sub>8</sub> = coefficient of the parameters to be estimated, while e<sub>1</sub> was the error term and b<sub>0</sub> was the coefficient.

Four functional forms of the multiple regressions were employed to select the one with the best fit. The functional forms tried were:

$$\text{Linear function; } Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \dots b_8X_8 + e_i \quad \dots(2)$$

$$\text{Double log function : } \ln(y) = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + \dots b_8 \ln X_8 + e_i \quad \dots(3)$$

$$\text{Semi log = } Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + \dots b_8 \ln X_8 + e_i \quad \dots(4)$$

$$\text{Exponential function; } \ln Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \dots b_8X_8 + e_i \quad \dots(5)$$

The choice of the best functional form was based on the magnitude of the R<sup>2</sup> value, the high number of significance, size and signs of the regression coefficients as they conform to *a priori* expectation.

### Benefit Cost Ratio:

The net farm income of the pig production technologies was estimated using the Benefit Cost Ratio. Theoretically, net revenue (NR) is the total revenue (TR) less the total cost (TC);

$$NR = TR - TC \quad \dots(6)$$

Total cost is the addition of the entire variable cost (VC) and fixed cost (FC) items;

$$TC = TVC + TFC \quad \dots(7)$$

Total revenue is the total amount of money that a farmer received from the sale of stock;

$$TR = \sum P_x Q_x \quad \dots(8)$$

$$\text{Gross margin (GM)} = TR - TVC \quad \dots(9)$$

$$\text{Net farm income (NFI)} = GM - TFC \quad \dots(10)$$

The rate of return is a performance measure used to measure the amount of return on an investment relative to the investment cost. It is given by:

$$\text{Rate of Returns (ROR)} = NR/TC \quad \dots(11)$$

$$\text{Gross Ratio (GR)} = TC/TR \quad \dots(12)$$

$$\text{Benefit Cost Ratio (BCR)} = TR/TC \quad \dots(13)$$

P = price per pig

Q = quantity of pig sold

Pig production is profitable, if its BCR  $\geq 1$ . The higher the BCR, the more profitable the pig production business is. Depreciation was calculated using the straight-line method.

## **RESULTS AND DISCUSSIONS**

### **Socio-economic variables of pig farmers and their production technologies**

The mean age of the farmers was determined and presented in Table 1. The result revealed the mean ages to be 44, 42, and 47 for farmers that used the intensive, semi intensive and extensive production technologies respectively. This implied that the farmers were young and in their middle age. Pathraja and Oyedipe (1997), who reported youth domination in agricultural production. The authors further reported that this farming age group were observed to be very innovative and motivative to enhance pig production frontier.

The educational attainment of the farmers was considered and presented in Table 1. The result revealed the average educational level of the farmers to be 17 years, 12 years, 7 years for intensive, semi intensive and extensive production technological systems respectively. It has been observed that educational status of the farmers enhances receptiveness to innovation, managerial skill, ability to comprehend and assess new production technologies in order to enhance profitability of business through improved farm productivity (Ajala, 2007).

Household size obtained showed a mean household size of 6 persons (intensive), 7 persons (semi intensive) and 8 persons (extensive) production technologies. Household size is a very important variable in labour utilization. Ume *et al.* (2018), however, reported that where the household members were not of labour age, but dependent population, that such household size become financial burden to household head. Access to credit was determined and mean credit was observed to be ₦250,000 (intensive production technology), ₦210,000 (semi intensive) and ₦182,000 (extensive pig production technology). Adeshinwa *et al.* (2003) observed that pig production is capital intensive especially among poor resource farmers.

The result of the farming experience obtained revealed that the average farming experience for farmers of intensive pig production technology was nine (9) years. The mean farming experience for semi intensive production technology was twelve (12) years that of extensive production technology was sixteen (16) years. Ume *et al.* (2020) noted that farming experience enables farmers to set a realistic goal and managerial success to achieve profit maximization.

The mean value of farm income for intensive pig production technology farmers was ₦864,321, while semi intensive production technology farmers and extensive production technology farmers were (₦653,654) and (₦432,000) respectively. Bamiro (2008) opined that farm income is an important variable in determining the scope of the farm, access to technologies and farmer's wealth. Labour input requirement for intensive production technology was higher with a mean of 54.20 man-day. Semi intensive production technology had a mean of 34.60 man-day and that of extensive production technology was 16.80 man-day.

The result determined revealed the mean quantity of drug and vaccines used in intensive production technology was (10.40), with semi intensive production technology having a mean quantity of (7.20), while the extensive production technology had a mean of (4.60). The result of the mean extension contacts with farmers showed that intensive, semi intensive and extensive pig production technology were 24.60, 19.80 and 6.20 respectively. Ume *et al.* (2018) opined that poor extension contact may lead to poor productivity with a consequent low income.



**Table 1. Socioeconomic variables of pig farmers and their production technologies**

Variables	Intensive		Semi intensive				Extensive					
	Mean	Std	Min	Max	Mean	Std	Min	Max	Mean	Std	Min	Max
Age	44	12.05	32	74	42	13.01	29	77	47	8.24	35	78
Education	17	7.23	6	24	12	4.24	12	16	7	12.02	6	15
HH Size	6	2.06	4	8	7	4.67	5	7	8	8.24	4	9
Credit	250,000	14.89	98,000	350,123	210,000	13.89	134,890	302,009	182,000	15.08	67,432	267,090
Farm Income	864,321	23.12	345,902	80,673	653,654	24.53	231,098	876,084	432,000	20.80	156,000	548,098
Vet. Services	25.4	7.81	14	34	14.4	3.29	8	26	7.6	5.6	6	14
Extension	24.6	0.65	8	45	19.8	2.19	38	28	6.2	6.09	8	34
Labour	54.2	6.76	23	63	34.6	12.04	23	56	16.8	6.79	18	48

**Source:** Field Survey, 2018. N/B; HH = Household, Vet. = Veterinary



## **Effects of farmers' socio-economic characteristics on profitability of pig production technologies**

To determine the effects of farmer's socioeconomic characteristics on profitability of pig production technology in the study area, Cobb Douglas production function was chosen as lead equations for intensive and semi intensive production technologies based on statistical and econometric criteria. The semi log function was applied to determine the extensive production technology. The result indicated that the coefficients of determinations ( $R^2$ ) for intensive production technology was 0.847, semi intensive production technology was 0.785 while extensive production technologies was 0.778. This implied that the variation in the output of the production technologies, intensive (84.70%), semi intensive (78.50%) and extensive (77.80%) were accounted for by variables included in the models, while the remaining intensive (15.30%), semi intensive (21.50%) and extensive (22.20%) production technologies were due to error terms. The coefficient of the age of intensive production technology farmers was 2.043 and statistically significant at  $P < 0.05$ . The result of the semi intensive and extensive production technologies had positive values of 0.098 and 1.621 respectively. This implied that age is positively related to profit. This also implied that younger farmers were likely to make more profit.

The coefficient of production experience for intensive production technology had a positive figure of 3.090(2.091) and was significant at  $P < 0.05$ . The semi intensive production technology had a coefficient of 3.099 and significant at  $P < 0.05$ . The extensive production technology had a positive coefficient of 1.621 and was significant at  $P < 0.05$ . The result implied that a unit increase in the variable could lead to an increase in the profit by the magnitude of the coefficient. This result was in accordance with the findings of Ouma *et al.* (2014). The authors observed that farmers with long years of pig production experiences had higher proclivity of setting accurate strategies of boosting pig production frontier for increased and maximization of profit. In line with *a priori* expectations and in synonymous with Osondu *et al.* (2014), the coefficient of access to credit 2.009 was positive and significant at  $P < 0.01$  for semi intensive production technology. The coefficient of access to credit for the intensive production technology was 1.421 and significant at  $P < 0.05$  while the coefficient of credit for extensive production technology was 2.902 and significant at  $P < 0.05$ . The result implied that access to credit might increase farmers' production frontier with a higher output and profit. However, Ume *et al.* (2020) opined that the farmer access to credit may not actually increase profit as there could be diversion of credit into non farming activities.

The coefficient of educational attainment was 2.543, 0.775 and 0.543 for the intensive, semi intensive and extensive production technologies respectively. Intensive production technology was significant at  $P < 0.001\%$ , semi intensive at  $P < 0.05$  and extensive production technology was significant at  $P < 0.01$ . The positive relationship between this variable and profit implied that a unit increase in the variable could transform to an increase in profit earned by a size of the coefficients. Educational status of the farmers enhances their receptivity and managerial ability, improves productivity, increase output and profit (Kaine and Ume, 2023; Ochiaka and Kaine 2022; Kaine, 2021). Adesehinwa *et al.* (2003) found indirect relationship between the education and profit.

The coefficient of cost of medication was positive and significant at  $P < 0.001\%$  and  $P < 0.1\%$  for intensive and semi intensive production technology respectively. The result for extensive production technology was negative -0.528 but was significant at  $P < 0.01$ . The result implied that the higher the access to medications the higher the increase in output and profit generated.

**Table 2. Results of Ordinary Least Square Production Function**

Variable	Intensive				Semi Intensive				Extensive			
	Linear	Cobb Douglas	Exponential	Semi log	Linear	Cobb Douglas	Exponential	Semi log	Linear	Cobb Douglas	Exponential	Semi log
Age	0.231 (1.009)*	2.043 (2.003)**	0.647 (0.876)	1.554 (-1.654)*	0.754 (1.098)*	0.098 (1.0078)	0.543 (0.321)	0.442 (-0.751)	1.609 (-1.009)*	0.008 (-2.0654)**	1.090 (-1.092)*	1.621 (0.654)
Exper	0.098 (0.321)	3.090 (2.091)**	0.004 (0.663)	2.008 (0.004)	0.882 (0.113)	3.099 (2.066)**	1.00 (1.004)*	0.551 (1.559)*	1.090 (0.761)	2.021 (0.007)***	1.039 (0.316)	0.0443 (2.093)**
Feed	0.531 (0.532)	0.490 (3.702)	0.921 (1.387)*	0.432 (1.098)*	0.336 (0.430)	2.085 (2.031)**	1.765 (0.613)	0.319 (0.692)	0.518 (10.442)*	0.865 (0.881)	2.091 (0.310)	-3.807 (-2.009)**
Credit	0.102 (2.543)**	2.009 (1.909)*	0.031 (2.091)*	2.023 (1.098)*	0.992 (2.081)**	1.421 (2.014)**	0.043 (1.006)*	4.005 (3.008)***	0.654(- 2.003)**	3.098 (1.021)*	2.008 (1.0194)*	2.902 (2.5432)**
Educ.	0.983 (3.03)***	2.543 (4.009)***	1.021 (3.002)***	2.009 (1.009)*	1.0921 (3.001)***	0.775 (2.900)**	2.001 (2.821)**	0.543 (1.098)*	3.5402 (3.072)***	0.442 (2.00.01)**	1.005 (2.012)**	0.543 (1.097)*
Flock	2.239 (0.041)***	0.006 (2.444)	0.719 (0.662)	4.006 (0.532)	1.089 (2.621)**	1.992 (1.115)*	1.531 (0.443)	0.221 (0.661)	1.2976 (2.409)**	1.054 (0.876)	0.543 (0.541)	1.765 (1.006)
Medication	2.0542 (3.189)***	3.089 (4.870)***	1.990 (0.567)	2.004 (0.65)	1.3241 (1.098)*	1.774 (0.722)	1.007 (0.532)	2.891 (0.590)	0.5438 (-1.054)*	0.277 (0.475)	3.671 (0.557)	-0.528 (-2.005)**
Water	0.7543 (0.009)	1.905 (0.375)	0.427 (0.073)	1.006 (1.804)*	0.9236 (0.432)	0.475 (0.774)	1.659 (0.444)	2.006 (0.668)	0.4210 (0.671)	0.663 (0.555)	3.005 (0.0065)	2.007 (0.886)
Labour	-0.094 (-4.29)*	0.776 (-2.093)**	0.215 (0.367)	0.0632 (0.991)	0.007 (0.406)	2.176 (-1.478)*	0.543 (0.396)	2.729 (1.234)*	0.654 (0.548)	0.654 (0.331)	3.098 (0.619)	0.325 (1.091)
Cont	8.009 (4.5985)***	6.007 (5.075)	7.074 (12.098)	6.006 (5.008)***	12.970 (6.902)***	3.906 (12.127)**	6.043 (4.777)***	6.772 (10.743)***	9.082 (13.666)***	13.113 (4.557)***	7.071 (4.818)***	6.884 (7.990)***
R <sup>2</sup>	0.432	0.847	0.643	0.532	0.543	0.785	0.547	0.654	0.664	0.543	0.587	0.778
F - Ratio	5.765***	7.897***	7.321***	5.320***	6.873***	6.551***	5.159***	6.008***	5.051***	6.706***	4.998***	6.009***

**Source:** Field Survey, 2018 \*\*\*, \*\*, \* significant at 1.0%, 5.0% and 10.0% levels of probability respectively. The figure in parenthesis is the t-ratio., N/B. Exper. = Experience in farming, Cont = Constant,

Klrem *et al.* (1997), however noted that most markets in Africa are flooded with adulterated and substandard drugs and vaccines, leading to most pig farmers deserting the business due to high mortality rate with low profit.

The coefficient of cost of labour was negative and statistically significant at 5 % for intensive production technology, 10% for semi intensive production technology and at 10% level of significance for extensive production technology. The sign was in consonance with the *a priori* expectation, implying that the higher the costs of labour, the higher the cost of production and the lower the accruing profit. This result is in line with the findings of Ume *et al.* (2018) and Rahman *et al.* (2008) who opined that as cost of labour increases, farmer's profit reduces.

### Costs and return of pig of pig production technology

Profitability of pig production in the study area was determined and presented in Table 3. The result showed that total variable cost of production was high in all production technology used and formed the major components of the cost items. Total variable cost accounted for about 94% - 95% of the total cost of production for all production technologies used. Total variable cost for the intensive production technology was ₦383,458, semi intensive and extensive production technologies was ₦292,397 and ₦276,108 respectively. The total fixed cost accounted for about 5% - 6% of total cost of production in all the production technologies. Total fixed cost for intensive production technology was ₦24,000, semi intensive and extensive production technologies was obtained ₦18,000 and ₦14,000 respectively. Total cost of production for intensive production technology was ₦407,458, semi intensive production technology was ₦310,397 and extensive production technology was ₦283,892. A positive BCR was obtained with a sign greater than 1. This implied that pig production in the study area was viable and profitable.

**Table 3 Costs and Return of pig production technology**

Item	Intensive			Semi intensive			Extensive		
	Quantity	Unit Cost	Total Cost	Quantity	Unit Cost	Total Cost	Quantity	Unit Cost	Total Cost
Return									
Sales of manure	120bags	350	42,000	100bags	300	30,000	50	280	14,000
Sales of pig	10	70,000	700,000	10	64,000	640,000	10	56,000	560,000
Total			742000			675,000			574,000
Variable									
Cost of piglet	10	7,000	70,000		5600	56,000	10	5,200	52,000
Cost of labour	1	5,000	40,000	1	5000	40000	1	5,000	40,000
Medication			20,000			9,500			12,000
Cost of Feed			195,458			163,897			147,456
Cost of Water	4Tanker	6,000	24,000	2 tanker	6,000	12,000	2 tanker	6000	12000
Miscellaneous			16,000			11,000			12,652
TVC			383,458			292,397			276,108
TFC			24,000			18,000			14,000
Total Cost			407,458			310,397			290,108
N F I			334, 542			324,603			283,892
B C R			1:1.8			1:2.2			1:2.0
Gross Margin			356,542			382,603			297,892
Return on Investment			55%			45%			50%

**Source:** Field Survey; 2018



The ROI for intensive product technology was 55%, semi intensive production technology was 45% and extensive production technology was 50%. These implied that pig production in the study area was profitable. It also implied that for every ₦1.00 invested in pig production, there was a return of 55k, 45k and 50k for intensive production technology, semi intensive production technology and extensive production technology respectively.

## **CONCLUSION AND RECOMMENDATIONS**

The result of the study revealed that pig farmers in the study area were relatively young, well experienced in pig production technology and were low income earner. Literacy level was recorded to be high, labour input was high and extension contact with the farmers was low. Result of the coefficients of pig production experience showed that there was a direct relationship between the variable and the farmers' profit in all the production technology used. This implied that a unit increase in the variable will lead to an increase in the profit earned by the magnitude of the coefficient. The coefficient of access to credit for all the production technology was positive and significant at different alpha level of significance. This implied that credit had a positive relationship with profit generated. It also implied that increased access to credit will lead to expansion of pig production enterprise with a consequent increase in profit margin. There was a positive relationship between the education attainment of the farmers and profit generated. This implied that a unit increase in the variable could transform to an increase in profit earned by a size of the coefficients. The coefficient of cost of medication for extensive production technology was negative but significant determinant of profit earned. The negative relationship between cost of medication and profit implied that the higher the access to medications the higher the likelihood of increasing pig farmers level of output with a consequent increase in profit generated. The result of the profitability analysis determined showed that pig production was profitable in the area for all the technologies used. A positive BCR was obtained with a sign greater than 1. This implied that pig production in the study area was viable and profitable. The return on investment also revealed that pig production in the study area was profitable. Following the outcome of study, recommendations were made as:

- i. The result indicated that pig farmers in the study area were low income farmers. It was recommended that the farmers should form cooperative society, pull their resources together and enjoy the benefits of economics of scale.
- ii. Since the result showed that increased access to credit will lead to expansion of pig production enterprise with a consequent increase in profit generated, the recommendation was that policy makers should develop policies that will enhance credit availability to pig farmers. It was also recommended that financial institutions, government and non – governmental organizations should provide credit facilities to interested pig farmers with little or no stress.
- iii. The result showed that education had positive relationship with profit earned indicating that a unit increase in the variable could transform to an increase in profit earned. The recommendation was that agricultural training, seminars, workshops and out of school classes in production should be organized.
- iv. Since total variable cost accounted for over 90% of the total cost of production, expenses on variable cost items should be reduced.
- v. Pig production in the study area was revealed to be viable and profitable among the production technologies used. The recommendation was that campaigns on economics or



profitability of pig production should be carried out. The multiplier effect of this will be reduction in unemployment and rural urban migration among others.

## REFERENCES

- Antonio, R. and Silva, S. (2011). Livestock thematic paper: Tools for project Design. International Fund for Agricultural Development. Website at [www.ifad.org](http://www.ifad.org) link index: Value chain linking producers to market, [ifad.org/linkindex](http://ifad.org/linkindex)
- Adeshinwa, A. O. K., Makinde, G. E. O. and Oladele, I. O. (2003). Demographic characteristics of pig farmers as determinant of pig feeding pattern in Oyo State, Nigeria. Proceedings 8<sup>th</sup> Annual Conference of Animal Science Association (ASAN), September 16-18 in FUTO.
- Ajala, M. K., Adeshinwa, A. O. K. and Mohammed, A. K. (2007). Characteristics of small holder pig production in southern Kaduna Area of Kaduna State, Nigeria. *American-Eurasian Journal of Agriculture and Environmental Science*, **2**(2):182-188.
- Bamiro, O. M. (2008). Technical Efficiency in Pig Production in Ogun State, Nigeria. *Research Journal of Animal Sciences* **2**(3):78 – 82.
- Ochiaka, C. D. and Kaine, A. I. N. (2022). Resource Use Efficiency of Catfish farming in South – East, Nigeria. *Journal of Agriculture and Ecosystem Management*. **2**(1):19 – 23.
- Kaine, A. I. N., Ajeigbe, E. A. and Ogbonna, S. I (2021). Traditional goat production technology and income generation of goat farmers in Zangon Kataf Local Government Area, Kaduna State, Nigeria. *Journal of Agripreneurship and Sustainable Development*, **4**(2):64 – 75.
- Kaine A. I. N. (2021). Application of Stochastic Frontier Production Function in estimating technical efficiency of backyard goat farming in Igabi Local Government Area, Kaduna State, Nigeria. *FUW Journal of Agriculture and Life Sciences (FUNJALS)*, **4**(1):303– 313.
- Kaine, A. I. N. (2018). Profitability and marketing efficiency of fish processing among small holder fish processors and marketers in Ojo Local Government Area, Lagos Nigeria. *International Journal for Agriculture and Rural Development*, **21**(1):3425 – 3431.
- Kaine, A. I. N. and Awolumate, S. (2017). Impact of Microfinance Banks in Economic Development in Ukwuani Local Government Area, Delta State, Nigeria. *FUW Journal of Agriculture and Life Sciences*, **2**(1):69-75.
- Kaine, A. I. N. and Ume, S. I. (2023). Loan Repayment and Credit Worthiness of Farmers under Bank of Agriculture in Enugu State of Nigeria. *Nigerian Journal of Agriculture and Agricultural Technology*, **3**(1):30-38.
- Kaine, A. I. N. and Ume, S. I. (2017). Economics of snail production among small – holder farmers in South – East Nigeria. *Journal of Agriculture and Food Environment*, **4**(2):13–23.
- Khem, R. S., Pinsun, L. and Zaleski, M. H. (1997) Economic analysis of size and feed type of swine production in Hawaii. *Swine Health and Production*, **5**(3): 103–110.
- Mevlut, V. D., Hasan, Y. and Hilal, Y. (2016). Technical efficiency of goat farming in Turkey: A case study of Kparta province. *Revista Brasileira de Zootecnia, Sociedade Brasileira de Zootecnia*
- Muhanguzi, D., Lutwama, V. and Mwene, F. N. (2012). Factors that influence pig production in Central Uganda - A case study of Nangabo sub-county, Wakiso District. *Veterinary World*, **5**(6): 334–351.
- NAADS (National Agricultural Advisory Services), (2011) User guide on pig husbandry. Ministry of Agriculture Animal Industry and Fisheries, Entebbe.



- Okolo, C. I. (2011). Tropical Tips on Intensive Pig Production: Animal Management and Health Issues. Technical Notes: Tapas Institute of Scientific Research and Development. Pp 240-246.
- Osondu, C. K., Ijioma, J. C., Anyiro, C. O and Obike, K. (2014): Economic Analysis of Pig Production in Abia State, Nigeria. *International Journal of Applied Research and Technology*, **3**(3): 3 – 10.
- Ouma, E., Dione, M., Lule, P., Rosel, K. and Pezo, D. (2013). Characterization of smallholder pig production systems in Uganda. Constraints and opportunities for engaging with market systems. International Livestock Research Institute. **87 pp**.
- Ouma, E., Roesel, K., Dione, M., Carter, N., Pezo, D., Ejobi, F. and Delia, G. (2014). Participatory Research for Development to Upgrade Smallholder pig value chains in Uganda. Bridging the gap between increasing knowledge and decreasing resources. International Livestock Research Institute, Nairobi.
- Rahman, S., Barthakur, S., Kalita, G. (2008): **Pig production and management system in Aizawl district of Mizoram, India**. Healthcare 95, 5 p.
- Pathraja, N. and Oyedipe, E. O. (1997). Indigenous pigs of Nigeria. *Animal Genetic Resources Information*, **7**(5):67-78.
- Ume, S. I., Onwujiariri, E. B., Nnadozie, A. K. O. (2020). Pig Farmers' Socioeconomic Characteristics as Determinant to Pig Production and Profitability in the Tropics. *International Journal of Research and Review*, **7**(4):45-56.
- Ume, S. I., Ezeano, C. I. and Gbughemobi, B. O. (2018). Analysis of the Environmental Effect of Pig Production in Okigwe Local Government Area of Imo State, Nigeria. *International Journal of Environmental & Agriculture Research*, **4**(6):64-75
- Ume, S. I., Ezeano, C. I., Onunka, B. N. (2018). Technical efficiency of pig production in Enugu north agricultural zone of Enugu state, Nigeria. *International Journal of Research and Review*, **5**(9):61-69.
- Ume, S. I., Jiwuba, P. C., Okoronkwo, M. O. and Okechukwu, S. O. (2019). Economics of Pig Production in Ezza North Local Government Area of Ebonyi State, Nigeria *Asian Journal of Agricultural Extension, Economics & Sociology*, **29**(1):1-11.